# THE JOURNAL of

# THE AUSTRALIAN MATHEMATICAL SOCIETY

# SERIES B APPLIED MATHEMATICS VOLUME XXI — PART 3

### January 1980

J. H. LOXTON and J. W. SANDERS	The kernel of a rule of approximate integration .	257
JAMIS A. FILL and ALAN J. IZENMAN	Invariance properties of Schoenberg's tone row system	268
P. D. SIMMS	On the solution of a partially structured nonlinear program	283
J. D. LOVE	Solution of homogeneous linear difference equations	293
S. ROSENBLAT	Asymmetric bifurcation	297
KRISORN JITTORNTRUM and M. R. OSBORNE	A modified barrier function method with improved rate of convergence for degenerate problems.	305
A. M. ARTHURS	Hypercircle estimates for nonlinear problems .	330
H. A. BUCHDAHL	Scale covariant Lagrangians and spaces reciprocal to static Einstein spaces	338
DAVID CLARK	An algorithm for solving the restricted least squares problem	345
SRIBATSA NANDA	A note on maximal and minimal causal spaces .	357
JOHN PAINE and FRANK DE HOOG	Uniform estimation of the eigenvalues of Sturm- Liouville problems	365
Corrigendum V. T. BUCHWALD	The diffraction of elastic waves by small cylindrical cavities	384

## Printed and Published for

### THE AUSTRALIAN MATHEMATICAL SOCIETY

#### THE JOURNAL

The Journal of the Australian Mathematical Society began publication in 1959, and from 1975 appears in two series, Series A (Pure Mathematics) and Series B (Applied Mathematics). Information about Series A may be found on the inside back cover.

#### SERIES B APPLIED MATHEMATICS

This series will be published in volumes, comprising four parts, starting with volume XIX Part I in 1975. From 1980, four parts will be published annually. Subscriptions may be arranged through the Business Manager (see inside back cover). The annual cost for 1980 is A\$50.

It is the editorial policy of Series B to accept papers in any field of applied mathematics and related mathematical sciences, excluding statistics. Novel applications of mathematics in real situations are welcomed. Authors are encouraged to write an introduction accessible to the whole applied mathematical community. Every effort will be made to publish suitable material with a minimum of delay.

#### Editor of the Journal

I. H. SLOAN, School of Mathematics, The University of New South Wales, P.O. Box 1, Kensington, N.S.W., Australia, 2033.

W. E. SMITH (Acting Editor, 1979), School of Mathematics, The University of New South Wales, P.O. Box 1, Kensington, N.S.W., Australia, 2033.

#### Associate Editors

 B. D. O. ANDERSON,
 Department of Electrical Engineering,
 University of Newcastle,
 Newcastle, N.S.W. 2308.

C. A. HURST,
Department of Mathematical
Physics,
University of Adelaide,
Adelaide, S.A. 5000.

S. ROSENBLAT, Department of Mathematics, University of Melbourne, Parkville, Vic. 3052. V. T. BUCHWALD, School of Mathematics, University of N.S.W., P.O. Box 1, Kensington, N.S.W. 2033.

J. IMBERGER,
Department of Civil
Engineering,
University of W.A.,
Nedlands, W.A. 6009.

W. E. SMITH, School of Mathematics, University of N.S.W., P.O. Box 1, Kensington, N.S.W. 2033. V. G. HART, Department of Mathematics, University of Queensland, St Lucia, Qld 4067.

M. R. OSBORNE, Department of Statistics, IAS, Australian National University, P.O. Box 4, Canberra, A.C.T. 2600.

C. J. THOMPSON, Department of Mathematics, University of Melbourne, Parkville, Vic. 3052.

#### Assistant Editors

N. G. BARTON, D. E. MACKENZIF, School of Mathematics, The University of New South Wales, P.O. Box 1, Kensington, N.S.W., Australia, 2033.

Manuscripts (two copies) for publication should be sent to the editor or to an appropriate associate editor at the address given above. Such action is a representation by the author that the manuscript has not been copyrighted or published, and that it is not being considered for publication elsewhere.

Authors are asked to read the section "Preparation of Manuscripts" on the outside cover.

Authors receive 50 free offprints of their papers; additional offprints may be ordered at cost. Excessive costs incurred by the Society through corrections to or withdrawal of articles may be charged to the authors concerned.